

RAP Figuring Slumped Mirrors to Remove Mid-Spatial Frequency Errors, Phase II

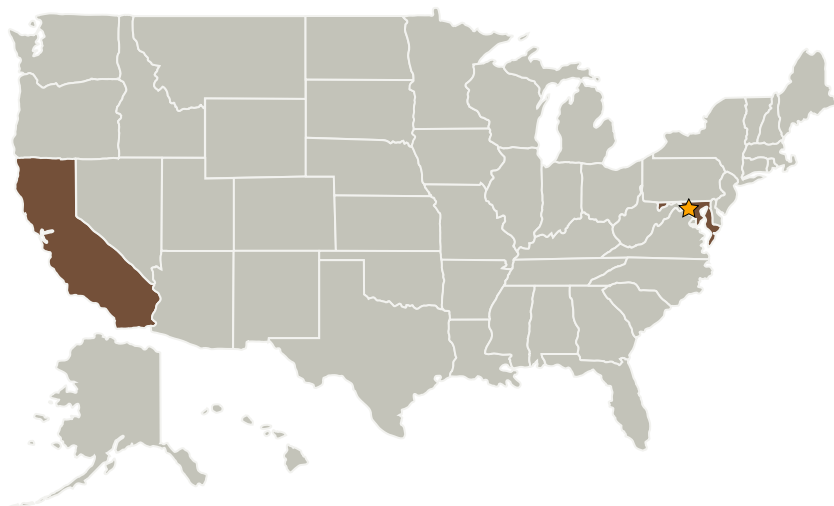
Completed Technology Project (2009 - 2010)



Project Introduction

Future X-ray telescopes require significant amounts of optical area. To accommodate this in a grazing incidence design, extremely thin mirrors are formed in concentric shell configurations. A slumping technique has been demonstrated with such thin, lightweight shells. However, the optical surface is found to contain a significant amount of mid-spatial frequency errors. Reactive Atom Plasma (RAP) is a figuring technique that does not impart mid-spatial frequencies to the optical substrate geometries and can additionally remove specific spectra from the figure error. RAP is a sub-aperture, atmospheric pressure, non-contact figuring technology that relies on a deterministic gas-phase etching of the optical surface with high material removal rates. Further, RAP has the ability to modulate tool footprint on the fly, allowing the removal of specific spatial frequencies from the error spectrum. RAP has already been demonstrated as a very credible approach for fabricating the lightweight wedges required for the assembly of such mirrors and is especially suitable for figuring extremely lightweight mirrors given the non-contact operation. In phase 1, we demonstrated the ability of the RAP process to impart minimal mid-spatial errors into the optical surface. A fully automated figuring platform with adjustable footprints is to be developed for phase 2.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
RAPT Industries, Inc.	Supporting Organization	Industry	Fremont, California

Primary U.S. Work Locations	
California	Maryland

Project Transitions

**December 2009:** Project Start**December 2010:** Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.2 Observatories
 - └ TX08.2.1 Mirror Systems